

REMARKS

This invention relates to a method of decomposing a thermosetting resin, and to an apparatus and a heat control program for carrying out the method.

The rejections of Claims 1, 2, 4-6, 8-12, and 17 under 35 U.S.C. § 102(b) as anticipated by U.S. 3,954,681 (Castle), and of Claims 13-16 under 35 U.S.C. § 103(a) as unpatentable over Castle in view of U.S. 5,616,623 (Münzmay et al), are respectfully traversed.

As described in the specification under "Description of the Background," beginning at page 1, line 8, processes exist in the prior art for decomposing thermosetting resins such as urethane resins, but they have been problematical, such as the requirement of inordinate amounts of time. The present invention addresses these problems.

As recited in Claim 1, the invention is a method of decomposing a thermosetting resin by a decomposer, comprising the steps of:

only pre-heating the thermosetting resin up to a preheating temperature T0;

kneading the pre-heated thermosetting resin together with a decomposer, and concurrently heating a mixture comprising the thermosetting resin and the decomposer up to a kneading temperature T1, thereby allowing a reaction to take place between the decomposer and the thermosetting resin to obtain a kneaded matter wherein the decomposer becomes consumed; and heating said kneaded matter to a maximum temperature T2 to decompose the thermosetting resin; wherein: said pre-heating temperature T0 is not higher than the boiling temperature of said decomposer; said kneading temperature T1 is not lower than said pre-heating temperature T0 but is lower than the thermal decomposition temperature of the thermosetting resin; said maximum temperature T2 is lower than the thermal decomposition temperature of the thermosetting resin; and said pre-heating of the thermosetting resin is performed under the following conditions of temperature T0 and time t:

$$100^{\circ}\text{C} \leq T_0 < 260^{\circ}\text{C}$$

$$0.5 \text{ min} \leq t \leq 7 \text{ min.}$$

The importance of both  $T_0$  and  $t$  is demonstrated in the comparative data of record. See, for example, Tables 1 and 2, at pages 26 and 27 of the specification, respectively, for Comparative Examples 1-3, compared to Example 1. Additional comparative data appears in the specification. See the description regarding Comparative Examples 4-6, and Examples 2-33. The comparative results could not have been predicted by the applied prior art.

Castle discloses a method of reclaiming cured polyurethane elastomers wherein the cured polyurethane elastomers are first put into fine particulate form, such as by soaking the elastomer in a suitable solvent to swell the polyurethane at least to a semi-brittle state so that it can be very easily crumbled to fine particle size and then removing the solvent (paragraph bridging columns 2 and 3); milling the particulate cured polyurethane under shear sufficient to generate an elevated temperature, preferably at least about 120°F and to cause the particles to form a coherent mass (column 3, lines 25-28), which may be carried out relatively rapidly such as for about two minutes or so (column 3, lines 49-53); initiating devulcanization by adding a devulcanizing agent which is a suitable aliphatic alcohol, water, or mixture thereof to the cohesive mass (paragraph bridging columns 3 and 4), wherein the operating conditions increases the temperature during the devulcanizing step to between about 120°F and 280°F (column 4, lines 31-34). In Example 1 therein, the cohesive mass is subjected to a temperature of about 220°-270°F, while the mass is being mixed in a mixer under compression, whereby water is added to the mixture and mixing is continued for 15 minutes.

It is clear from Example 1 that water is present as a devulcanizing agent therein. Other devulcanizing agents are used in some of the other examples, although it is noted that contrary to the finding by the Examiner, butanediol used in Example III is used as a curing agent, not a devulcanizing agent.

Castle neither discloses nor suggests the presently-claimed invention. Castle neither discloses nor suggests a pre-heating step, *per se*. In Castle, prior to carrying out devulcanizing, heating is carried out during the milling step, and optionally during the swelling step (column 3, lines 1-3). Castle neither discloses nor suggests the simple expedient of pre-heating, as recited herein, prior to kneading a pre-heated thermosetting resin together with a decomposer, and the superior results obtained thereby, as demonstrated in the specification and discussed above.

Münzmay et al does not remedy the deficiencies of Castle. Münzmay et al has been relied on for a disclosure of compounds, such as various ethanol amines and other amino alcohols, that react with polyurethanes for purposes of decomposing them. Münzmay et al is specifically concerned with compounds that contain at least two isocyanate-reactive hydrogen atoms. Such compounds include diols and triols, also disclosed by Castle. But without the present disclosure as a guide, one skilled in the art would not have combined Castle and the disclosure of ethanol amines in Münzmay et al, since Castle is limited to water and alcoholic devulcanizing agents. Moreover, even if these references were combined, the result would still not be the presently-claimed invention.

In response to the above arguments, the Examiner finds that Castle "uses milling as a means of heating the polyurethane waste to a temperature high enough to obtain the cohesive force." Thus, the Examiner, in effect, admits that Castle neither discloses nor suggests *only* pre-heating, as recited in Claim 1 herein. Indeed, in Castle, the step analogous to the presently-recited pre-heating step involves milling, i.e., a step wherein the polyurethane resin is changed by mechanical forces, beyond a change in temperature. Note that Applicants' argument is not that Castle does not specifically disclose the term "pre-heating," but rather that the step of Castle analogous to the presently-recited pre-heating step requires milling as well.

The Examiner states that the present claims "are very broad and therefore allow any means of pre-heating the polyurethane waste. Therefore, milling that is a source of heat qualifies. Furthermore, term cohesive form, means that the polyurethane waste had to be heated, because it is softened."

In reply, Applicants admit that there is more than one way to pre-heat. But, the claims require *only* pre-heating, which means that whatever the source of pre-heating is, it must not effect a mechanical force, for example, on the thermosetting resin.

The Examiner relies on *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971) in support of the combination of Castle and Munzmay et al. In reply, *McLaughlin* is inapposite, since the rejection **does not** take into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and **does** include knowledge gleaned only from Applicants' disclosure.

It appears that the Examiner may have ignored the term "only" before "pre-heating" in Claim 1 as if it were new matter, although no such rejection has been made. If the Examiner believes the term is new matter and has thus read the claim as if it were not there, this is improper. Indeed, as MPEP 706.03(o), Examiner Note 3, mandates, "[a]s to any other appropriate prior art . . . rejection, the new matter must be considered as part of the claimed subject matter and can not be ignored" (emphasis added.) See also MPEP 2143.03. Thus, the Examiner must treat the claims as she finds them. Whether or not the term is new matter is a separate issue. Nevertheless, the presently-claimed invention complies with 35 U.S.C. § 112, first paragraph. One skilled in the art would have understood that the term "only" was inherently described. See, e.g., *Kennecott Corp. v. Kyocera Int'l, Inc.*, 835 F.2d 1419, 5 USPQ2d 1194 (Fed. Cir. 1987) (term "equiaxed microstructure" not literally disclosed held to be inherent property of claimed sintered ceramic body); *In re Wright*, 866 F.2d 422, 9 USPQ2d 1649 (Fed. Cir. 1989) (term "not permanently fixed thereto" not literally disclosed

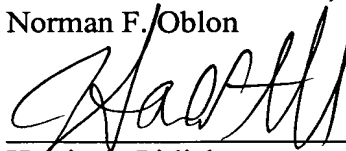
held to be described by absence of disclosure of permanently fixed microcapsules); and *In re Voss*, 557 F.2d 812, 194 USPQ 267 (CCPA 1977) (term "crystalline content . . . at least 50% by weight" not literally disclosed held to be described by literal disclosure of "glass-ceramic material" coupled with evidence that one skilled in the art would have attributed the recited crystalline content as inherent in that material). **Copies of *Kyocera*, *Wright*, and *Voss* are enclosed.**

For all the above reasons, it is respectfully requested that the rejections over prior art be withdrawn.

Applicants gratefully acknowledge the Examiner's indication of allowability of the subject matter of Claims 3 and 7. Nevertheless, Applicants respectfully submit that all of the presently pending and active claims in this application are in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.  
Norman F. Oblon



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Harris A. Pitlick  
Registration No. 38,779

Customer Number  
**22850**

Tel: (703) 413-3000  
Fax: (703) 413 -2220  
(OSMMN 08/03)  
NFO/HAP/cja